DETAILED ACTION

Claim Objections

1. Claims 1-8 are objected to because of the following informalities:

In claim 1, lines 7 and 8, it is suggested that the phase "**despread data signal**" be replaced by -- **despreaded data signal** --.

Appropriate correction is required.

In claim 1, line 5, it is suggested that the transitional phrase "**consisting in**" be replaced by either -- **consisting of** -- or -- **comprising** --. For the purpose of examination, the transitional phase "**consisting in**" is interpreted as "**consisting of**".

2. Claim 15 is objected to because of the following informalities:

In claim 15, line 1, it is suggested that the phase "**The receiver as claimed in any of claims 11**" be replaced by -- **The receiver as claimed in claim 11 --.**

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as failing to set forth the subject matter which applicant(s) regard as their invention. Claim 4 recites the limitation "ALTBOC scheme". There is insufficient antecedent basis for this limitation in the claim. "ALTBOC scheme" is neither defined in claim 4 nor in its parental claim 1.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 3, 5, 6, 8, 9 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Schilling (US 6,396,824 B1).

Consider claims 1 and 9:

Schilling discloses a method for the demodulation of radio navigation signals (s(t)) transmitted in spread spectrum (*see Schilling at col. 2, lines 10-24, where Schilling describes a method that can be used in a spread-spectrum CDMA communication system for geo-locating a remote unit*) and comprising a data channel which is modulated by a navigation message (*see Schilling at col. 2, lines 10-24, where Schilling describes a modulated message data signal*) and a pilot channel which is not modulated by a navigation message (*see Schilling at col. 2, lines 10-24, where Schilling describes using a separate spread-spectrum channel as a pilot signal; see col. 2, lines 50-55, where Schilling describes the pilot channel is not modulated by the message data*), the data channel and the pilot channel being combined into one multiplexing scheme in

order to modulate a carrier (*see Schilling at col. 3, lines 26-46, where Schilling describe combining the base-generic-chip-code signal, i.e. the pilot signal, with the spread-spectrum processed message data to generate a CDMA signal to be transmitted; see col. 7, lines 45-50, where Schilling describes the carrier frequency is f_0*), this method consisting of:

- subjecting the signals of the pilot and data channels to de-spreading processing (*see Schilling at Fig. 2, col. 7, lines 51-67 and col. 8, lines 1-37, where Schilling describes that generic mixer 123 uses the replica of the generic-chip-code signal for dispreading the CDMA signal; the message mixer 124 uses the replica of the message-chip-code signal for dispreading the CDMA signal*) and
- demodulating the despreaded data signal (r_d) in order to obtain the navigation message (d(t)) (*see Schilling at Fig. 2 and col. 8, lines 38-45, where Schilling describes the detector 139 demodulates the modulated data signal to get the message data*),
- characterized in that the demodulation of the despreaded data signal (r_d) used to obtain the navigation message (d(t)) is performed with the aid of the carrier (r_p) obtained from the despreading processing of the pilot channel (*see Schilling at Fig. 2, col. 7, lines 60-67 and col. 8, lines 1-7, where Schilling describes that the dispreading using the generic-chip-code signal produces the recovered carrier signal; see col. 7, lines 5-12, where Schilling describes that the detector 139 uses the recovered carrier signal*).

Consider claim 3:

Schilling discloses the method as claimed in claim 1 above. Schilling discloses that the pilot channel and the data channel of the signal to be demodulated are phase-multiplexed (*see Schilling at col. 4, lines 62-67, where Schilling teaches that the received signals are phase modulated*).

Consider claim 5:

Schilling discloses the method as claimed in claim 1 above. Schilling discloses that the pilot channel and the data channel of the signal to be demodulated are multiplexed in accordance with a scheme in which the carrier contains at least the data channel and the pilot channel of the signal to be demodulated (*see Schilling at Fig. 2 and col. 7, lines 39-50, where Schilling teaches a modulator 107 that modulates the combined generic-chip-code signal, that is the pilot channel, and spread-spectrum-processed signal, that is the data channel, by a carrier signal at a carrier frequency* f_0).

Consider claims 6 and 10:

Schilling discloses the invention as claimed in claims 1 and 9 above. Schilling discloses that the despreading processing is performed by code tracking or estimation processing, combined with carrier phase or frequency tracking or estimation processing (*see Schilling at Fig. 2 and col. 8, lines 8-26, where Schilling teaches a Acquisition and Tracking circuit 131 that acquires and tracks the carrier signal and provides input to the message-chip-code generator 122 that is used in dispreading; Schilling describes the message-chip-code generator 122 generates a replica of the message-chip-code signal based on the synchronization information from the Acquisition and Tracking circuit 131*),

Consider claim 8:

Schilling discloses the method as claimed in claim 1 above. Schilling discloses that it is applied to the demodulation of satellite navigation signals of the GPS-IIF L5, L2C type, or to the demodulation of satellite navigation signals transmitted by the GALILEO system, or transmitted by ground stations, by modernized GLONASS satellites or by COMPASS or QZS satellites (*see Schilling at the abstract, where Schilling describes a base station for transmitting message data in a system for locating remote units*).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schilling (US 6,396,824 B1) in view of Clapp (US 5,943,248).

Consider claim 2:

Schilling discloses the method as claimed in claim 1 above. Schilling discloses the combiner may be a nonlinear combiner (*see Schilling at col. 14, lines 25-31*). Schilling does not specifically disclose the nonlinear signal combination is time multiplexed. Clapp teaches time-multiplexing is a nonlinear signal combination (*see Clapp at col. 2, lines 60-67 and col. 3, lines*

1-2, where Clapp describes the combination of a first and a second input values with a non-linear combiner that is a time multiplexed combiner).

It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Schilling, and to have time multiplexed data channel and pilot channel, as taught by Clapp, thus allowing for hardware efficient signal combination, as discussed by Clapp (*see Clapp at col. 1, lines 65-67 and col. 2, lines 1-7*).

9. Claims 7, 11 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schilling (US 6,396,824 B1) in view of Thomas et al (US 6,711,219 B2).

Consider claims 7 and 11:

Schilling discloses the invention as claimed in claims 6 and 10 above. However, Schilling does not specifically disclose the carrier tracking processing is performed with the aid of a frequency-lock loop (FLL) and the code tracking processing is performed with the aid of a delay-lock loop (DLL).

Thomas teaches a carrier tracking processing is performed with the aid of a frequency-lock loop (FLL) (*see Thomas at col. 18, lines 1-9 and col. 23, lines 33-48, where Thomas teaches using a Frequency Lock Loop (FLL) to track carrier frequency*) and a code tracking processing is performed with the aid of a delay-lock loop (DLL) (*see Thomas at col. 18, lines 10-22 and col. 23, lines 33-48, where Thomas teaches using Delay Lock Loop (DLL) for code tracking*).

It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Schilling, and to have FLL and DLL, as taught by Thomas, thus allowing for simultaneous cross-channel and co-channel interference mitigation, as discussed by Thomas (*see Thomas at col. 23, lines 24-29*).

Consider claim 16:

Schilling in view of Thomas discloses the receiver as claimed in claim 11 above. Schilling does not specifically disclose that the frequency-lock loop (FLL) is designed to receive Doppler velocity aid from a navigation system.

Thomas teaches a frequency-lock loop (FLL) is designed to receive Doppler velocity aid from a navigation system (*see Thomas at Fig. 7 and col. 16, lines 38-63, where Thomas describes acquisition of Doppler offset for the frequency-lock loop, Thomas describes that the Doppler offset is a result of the relative velocity between the transmitter and a receiver*).

It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Schilling, and to have that the frequency-lock loop (FLL) is designed to receive Doppler velocity aid from a navigation system, as taught by Thomas, thus allowing for simultaneous cross-channel and co-channel interference mitigation, as discussed by Thomas (*see Thomas at col. 23, lines 24-29*).

10. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schilling (US 6,396,824 B1) in view of Thomas et al (US 6,711,219 B2), as applied to claim 11 above, and further in view of Lloyd et al (US 7,183,971 B1).

Consider claim 12:

Schilling in view of Thomas discloses the receiver as claimed in claim 11 above. Schilling does not disclose that the frequency-lock loop (FLL) comprises a discriminator of extended arctangent form.

Lloyd teaches a frequency-lock loop (FLL) comprises a discriminator of extended arctangent form (*see Lloyd at Fig. 4 and col. 10, lines 6-43, where Lloyd describes a FLL with an arctangent frequency discriminator 412*).

It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Schilling, and to have FLL with a discriminator of extended arctangent form, as taught by Lloyd, thus allowing for a broad range of selection of the loop update rate, as discussed by Lloyd (*see Lloyd at col. 10, lines 26-43*).

Consider claim 13:

Schilling in view of Thomas discloses the receiver as claimed in claim 11 above. Schilling does not disclose that the frequency-lock loop (FLL) comprises a first-order or second-order loop filter which is adapted to the dynamics of the received signals.

Lloyd teaches a frequency-lock loop (FLL) comprises a first-order or second-order loop filter which is adapted to the dynamics of the received signals (*see Lloyd at Fig. 4 and col. 10, lines 55-67, where Lloyd describes a first-order FLL loop filter 414*).

It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Schilling, and to have a first-order or second-order loop filter, as taught by Lloyd, thus allowing for a broad range of selection of the loop update rate, as discussed by Lloyd (*see Lloyd at col. 10, lines 26-43*).

11. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schilling (US 6,396,824 B1) in view of Thomas et al (US 6,711,219 B2), as applied to claim 11 above, and further in view of David (US 6,538,599 B1).

Consider claim 14:

Schilling in view of Thomas discloses the receiver as claimed in claim 11 above. Schilling does not disclose (1), the output of the filter of the frequency-lock loop (FLL) is coupled to the delay-lock loop (DLL), and (2), the delay-lock loop comprising a zero-order loop filter.

Regarding item (1), Thomas discloses the output of the filter of a frequency-lock loop (FLL) is coupled to the delay-lock loop (DLL) (*see Thomas at Fig. 7, col. 22, lines 64-67 and col. 23, lines 1-23, where Thomas shows the output of a FLL is connected to the input of a DLL*).

It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Schilling, and to have that the output of the filter of the frequency-lock loop (FLL) is coupled to the delay-lock loop (DLL), as taught by Thomas, thus allowing for simultaneous cross-channel and co-channel interference mitigation, as discussed by Thomas (*see Thomas at col. 23, lines 24-29*).

Regarding item (2), David teaches using a zero-order filter (*see David at col. 4, lines 15-37, where David describes a zero-order filter is utilized in a circuit*).

It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Schilling, and to have a zero-order filter, as taught by David, thus allowing for achieving further processing gains, as discussed by David (*see David at col. 4, lines 15-37*).

12. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schilling (US 6,396,824 B1) in view of Thomas et al (US 6,711,219 B2), as applied to claim 11 above, and further in view of Kowalski (US 6,470,044 B1).

Consider claim 15:

Schilling in view of Thomas discloses the receiver as claimed in claim 11 above. Schilling does not disclose that the delay-lock loop (DLL) comprises a discriminator which is applied to the pilot signals and to the data signals, the data signals being weighted by a coefficient which depends on the signal-to-noise spectral density ratio (C/N_0) of the received signals.

Kowalski teaches a delay-lock loop (DLL) that comprises a discriminator which is applied to a pilot signals and to a data signals (*see Kowalski at Fig. 2 and col. 10, lines 1-15, where Kowalski describes a DLL that has a first input connected to a finger receiver and a second input to receive a pilot signal*), the data signals being weighted by a coefficient which depends on the signal-to-noise spectral density ratio (C/N_0) of the received signals (*see Kowalski at Fig. 3 and col. 11, lines 5-11, where Kowalski describes that the receiver selectively weights the received signal to emphasize the signal to noise ratio*).

It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Schilling, and to have that the delay-lock loop (DLL) comprises a discriminator which is applied to the pilot signals and to the data signals, the data signals being weighted by a coefficient which depends on the signal-to-noise spectral density ratio (C/N_0) of the received signals, as taught by Kowalski, thus allowing for maximizing the signal to noise ratio in the presence of colored noise, as discussed by Kowalski (*see Kowalski at col. 8, lines 48-58*).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LIHONG YU whose telephone number is (571) 270-5147. The examiner can normally be reached on 8:30 am-7:00 pm Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on (571) 272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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